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THREE NEW SPECIES OF DIPLOPODA FROM VIRGINIA

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Collections of diplopods made in Virginia during the summers of 1947 and 1948 include several new species, three of which are herein described.

PARAIULIDAE

Saiulus montanus, new species
(Figures 5 & 6)

Diagnosis.—A small member of the genus, characterized as follows: posterior gonopods of male large, as high as anterior, coxal portion of anterior much reduced; outer valves of female gonopods fused with operculum along lateral edge.

Description of male holotype.—Width approximately 1.5 mm., length undetermined because of breakage; body with 51 segments, ventrolateral portion of each metazonite finely striate; anal valves inflated, large and somewhat protruding; spine of terminal segment large, strongly decurved, sharply pointed.

Color very dark brown or black (in alcohol) with the caudal half of each metazonite light tan, producing a sharply ringed appearance; collum and head lighter brown, front of head fading into tan at the labrum, antennae black; legs yellowish-brown.

Gonopds of the *canadensis* type, i.e., with the coxal elements of the anterior pair shorter than the femoral. Sternal plate small, its basal margin concave at the center, swept upwards toward the sides, distal margin produced into a triangular, distally rounded projection. Immediately laterad of the sternal plate are two small pyriform pieces, wide at their bases and tapering laterad, their ends bent proximal. Coxal plates broad at base, the outer basal portion set off by a conspicuous oblique groove; the inner, produced portion with a large mesial shoulder; the plate distally rounded. Femoral plates thin, upright pieces, three times as high as long, distally setose, the rear margin of each produced at about midlength into a small arm which projects caudomesiad and overlaps the posterior gonopods. Posterior pair of gonopods strongly chitinous, flattened, lamellae, as broad and high as the femora of the anterior pair, and distally crenulate. A single, clavate, structure projects distad in front of the posterior gonopods. See figure 6 for gonopods drawn in cephalic aspect.

Description of female allotype.—Width approximately 1.8 mm., length undetermined due to breakage; body with 52 segments. Color and other features much as in the male.

Female gonopods of the same type as those figured by Brolemann (1922: fig. 32) for *Saiulus immaculatus*, differing however, and distinct in the following characters: operculum relatively smaller in comparison with other parts, its caudal portion with a conspicuous, short indentation; outer valve smaller, its distal portion directed mesiad, the lateral edge fused with the operculum at about the same level as the point of fusion of the mesial edge with the inner valve.

Type specimens.—Male holotype, female allotype, and male paratype in the U. S. National Museum, No. 1847, collected on July 1, 1947.

Type locality.—Mount Rogers, Grayson County, Virginia, at an elevation of 5000 feet. The specimens were found beneath a board in a small grassy field, with the surrounding forest chiefly hemlock (*Tsuga* ssp.), maple (*Acer pennsylvanicum*), yellow poplar (*Liriodendron tulipfera*), and redbud (*Cercis canadensis*). Millipeds associated with the paraiulids were *Spirostrephon lactarium* (Say) and *Pseudopolydesmus serratus* (Say).

Distribution.—In addition to the type locality, *Saiulus montanus* has been found only at Mountain Lake, Giles County, Virginia, where several males and females (R.L.H. no. 108) were obtained at Castle Rock, west of the Biological Station, by members of the Arthropods class on July 20, 1947, and transmitted to me by Dr. Horton H. Hobbs, Jr. This locality is at about 4000 feet elevation, and in the same biotic province (Canadian) as is Mount Rogers.

Remarks.—Apparently *Saiulus* is a genus with boreal affinities, widespread in northern United States, but confined, in more southern latitudes, to high elevations. Another, rather different, species—*S. fumans* Chamberlin (1943:10)—has been described from the Great Smoky Mountains in Sevier County, Tennessee.

XYSTODESMIDAE

Nannaria shenandoa, new species

(Figures 1-4)

Diagnosis.—A small member of the genus, characterized by the distally expanded and bifid telopodite of the male gonopod, and by the falcate nature of the lateral process, unusual in being conspicuously bent mesiad across the main branch.

Description of male holotype.—Body small, length, 23.5, width, 4.2 mm.; sides nearly parallel, segments four through fourteen being of almost exactly full width, body thus tapering abruptly cephalad and gently caudad; dorsum but slightly arched, keels small and continuing slope of dorsum.

Head small, vertex with very faint groove, interantennal width, .83 mm;. length of antennae, 3.5 mm., sixth article conspicuously longer than the others which are subequal in length.

Collum large, subtrapezoidal in dorsal aspect, the caudal margin almost straight, the cephalolateral corners rounded, the cephalic margin slightly convex. Cephalolateral marginal ridges large and distinct.

Tergites of segments two through four similar, keels produced somewhat forward of rest of dorsum; marginal ridges well developed.

Tergites five through fifteen similar, keels more or less in line with rest of dorsum, marginal thickenings becoming larger; edges of keels slightly oblique, directed cephaloventrad, but to a lesser extent than in

most xystodesmids; anterior corners slightly rounded, posterior corners angular, becoming slightly produced towards the rear of the body; posterior margins of keels slightly sinuate; upper surface of tergites smooth.

Tergites of segments sixteen through nineteen becoming narrower caudad, with keels increasingly produced, those of nineteenth forming short, rounded, lobes, .45 mm. in length, width of tergite between bases of lobes, 1.12 mm.

Repugnatorial pores small, placed on the lateral margin of the keels, in the posterior third of the length.

Twentieth segment triangular in dorsal aspect, about as long as broad, tip slightly truncate. Anal valves almost flat, minutely wrinkled vertically, setiferous tubercules close to the well developed mesial ridges.

Preanal scale broad, short, triangular, the lateral tubercules obsolete.

Bases of last pair of legs well separated, prefemora[1] separated at base by approximately .34 mm.; sternites becoming wider cephalad, legs at midbody .91 mm. apart; the sternites between the last pair of legs on each segment posterior to the 6th produced into conspicuous sharp processes.

Legs at midbody with prefemora and femora small, subequal in size, tibia somewhat longer, tarsi 1 and 2 short, as broad as long, tarsus 3 longer, conical, tarsal claw short, heavy, angularly bent. Lengths of joints of legs, from base distad, .53, .53, .87, .38, .33, .41 mm.

Pleurites finely coriaceous, prozonite with the wrinkles much smaller. Stigma very narrow, upper end drawn out.

Gonopodal aperture broadly oval, the margin uninterrupted in front. Gonopods at rest with the basal portion caudad (facing cephalad when the organs are protruded), the tips of the telopodite blades crossing and directed caudolaterad. Coxa subcylindrical, the caudal portion much elevated, mesial side with a small but prominent rounded knob. Mesial process low, sparingly setiferous, rather broad in cephalic aspect; lateral process produced into a long, slender, falcate spine, curving mesiad across the femoral portion of the telopodite and distally recurved laterad. Telopodite slender, flattened at the base, becoming subcylindrical distad and curved mesiad and cephalad, the extremity becoming flattened and angularly bent proximad with a small "heel" at the outside edge of the bend. The distal half of this flattened portion is bifid.

Sternites between the fourth pair of legs with a pair of upright, subconical processes, very conspicuous and as high as the cylindrical seminal processes of the second pair of legs which in this form are longer than usual for xystodesmids. Other legs without special processes.

Color in life as follows: tergites blackish with outer portions of keels (both cephalo- and caudolateral corners) pink, head brown with margin of labrum and an interantennal band light tan; underparts pale gray, sternites tan. Antennae gray with distal portion of each article white.

Description of female allotype.—Agreeing in general with the male, differing as follows: length 25, width, 4.7 mm.; dorsum more arched; marginal thickenings and angularity of caudolateral corners of keels

[1]This term is arbitrarily used in preference to either coxa or trochanter for the joint between the femur and sternite, pending an investigation to determine which of the prefemoral joints is lost in xystodesmids.

more pronounced. Femoral spines larger, anterior sternites without paired processes.

Gonopodal aperture large, including second pair of legs and large female organs. Lateral edge of aperture margined with a thin upright flange, also caudal edge with an upright, shallowly indented flange. Gonopods composed of a pair of thick, reniform valves, their surface granular and setose in places, attached by their basal ends to a triangular receptacle, into which they are retractable. When protruded, the free ends are directed caudad and the valves are parallel with the median axis of the body. The left gonopod is illustrated, in lateral or outer view.

Color apparently not fully developed, being chiefly uniform tan with a dark median line on the tergites. Underparts white.

Type specimens.—Male holotype, female allotype, and male paratype in the U. S. National Museum, No. 1848. Four paratypes in my personal collection, RLH no. 160, collected on July 3, 1948.

Type locality.—Shenandoah Mountain, about 15 miles west of Harrisonburg, Rockingham County, Virginia, elevation about 3500 feet. Specimens were found in a rather dry stand of *Quercus* (*Q. alba* and related species) with undergrowth mainly scrub oak and laurel (*Kalmia latifolia*). The humus layer was about two inches deep, overlying loose sandstone fragments. The only invertebrates noted in association were numerous ants and a few small beetles.

Remarks.—The relationships of this species are clearly with the recently described *Nannaria morrisoni* Hoffman (1948:348), a form known from several localities in the Blue Ridge in Virginia. These two species, with another yet undescribed from Mountain Lake, Virginia, form a distinct section within the genus, differing from *N. media* and related forms in which the telopodite blade is bent laterad and distally unmodified. It is possible that the disjunct forms should be properly included in a separate genus, but it is felt that such a step should be preceded by a study of all the known forms of *Nannaria*, towards which I am now accumulating material.

Zinaria rubrilata, new species

Diagnosis.—A small member of the genus, related to *butleri*, characterized by the size, color of the metazonites, and the relatively short, straight lateral spine of the male gonopod.

Description of male holotype.—Body small, length, 32.5, width, 5.6 mm.; sides subparallel, segments five through fifteen of approximately full width; dorsum compressed, less arched than in *butleri;* keels relatively wide, continuing slope of dorsum.

Vertex of head with a very faint shallow groove. Interantennal width, 1.0 mm.; antennae relatively long, slender, 5.5 mm. in length. Labral pores in upper series, 20, in lower 20; labrum with a very deep median notch, teeth subequal in size.

Collum large, subellipsoidal in dorsal aspect, tapering evenly towards the ends, cephalolateral marginal ridge small but sharply defined.

Tergites of segments two through four similar, keels conspicuously bent forward, their posterior mesial margins well forward of caudal margins of tergite at midline; marginal ridges larger than on collum and

somewhat more tumid, upper surface of keels becoming coriaceous and caudolateral corner with a suggestion of a denticle.

Tergites five through fifteen similar, keels more or less in line with rest of dorsum, marginal thickenings becoming larger; edges of keels slightly oblique, directed cephaloventrad; anterior corners broadly rounded, posterior corners angular and slightly produced caudad, this becoming more pronounced towards the rear of the body; posterior margins of keels slightly sinuate; upper surface of keels distinctly coriaceous, of rest of dorsum finely wrinkled, prozonite smooth.

Tergites of segments sixteen through nineteen becoming narrower caudad, with keels increasingly produced, those of nineteen forming short, bluntly triangular lobes, .50 mm. in length; width of tergite between bases of lobes, 1.37 mm.

Twentieth segment triangular in dorsal aspect, somewhat elongate in appearance; two pairs of tiny lateral setiferous tubercules; tip slightly truncated. Anal valves slightly inflated, very finely wrinkled vertically, setiferous tubercules almost in contact with the well developed mesial ridges.

Preanal scale large, broadly triangular, lateral tubercules large and well set off from the margin.

Bases of last pair of legs almost in contact, prefemora separated at bases by approximately .37 mm.; sternites becoming wider cephalad, legs at midbody 1.0 mm. apart; the sternites between last pair of legs on each segment enlarged and slightly produced caudad, but not forming actual lobes or spines.

Legs at midbody with prefemora subtrapezoidal, flattened; femora short, cylindrical, femoral spine short, conical; tibiae elongated, cylindrical, enlarged distally; tarsus 1 much thicker than distal two, tarsus 3 the longest, bearing a slender curved claw; all joints with numerous slender bristles.

Pleurites finely but distinctly coriaceous. Stigmata cephalodorsad of legs, elongate, the ends pointed.

Gonopodal aperture broadly oval, margin uninterrupted at midline. Gonopods large, generally similar to those illustrated by Chamberlin (1939: fig. 5) for *butleri* (under the name *Z. urbana*), differing somewhat in having the long spine from the lateral process straight instead of bent mesiad across the face of the telopodite.

Sternites between third pair of legs with a pair of thin, upright, keel-like processes; those between fourth pair with two small, conical processes, their ends slightly crenulate. Coxae of second pair of legs with the usual seminal lobes; these short and slightly enlarged distally.

Color in life as follows: majority of tergite orange-red or bright chestnut brown, keels, legs, and pleurites yellowish; middle portion of collum and exposed parts of prozonites black; top of head brownish-black, fading into white along margin of labrum and in antennal sockets; antennae whitish-yellow, becoming slightly darker distally.

Description of female allotype.—Agreeing in general with the male, differing in the following respects: slightly smaller, length, 30, width, 6.1 mm.; dorsum more arched; body widest near posterior end; femoral spines larger; anterior legs without processes.

Gonopodal aperture wide and short, its edges without special rims or flanges as noted above under *Nannaria*. Exposed portion of gonopod

appearing tripartite (resembling three appressed fingertips); outer valve of gonopod with distal (free) end conspicuously larger than that of inner.

Color much as in the male, not as intense, black or prozonites slightly encroaching on metazonites.

Type specimens.—Male holotype, female allotype, and a paratype of each sex in the U. S. National Museum, No. 1849, and nine male and two female paratypes in my collection, RLH no. 161, to be distributed to other museums. All specimens taken together, July 13, 1948.

Type locality.—State Highway 3, one mile north of Kilmarnock, Lancaster County, Virginia. Specimens taken at the mouth of a culvert draining a large pond on the northeast side of the highway. Surrounding area chiefly wooded, a pine-oak association.

Remarks.—The nearest relative seems to be *Z. butleri* (McNeill), which is considerably different in lacking red on the dorsum (at least in all of the Virginia material referred to *butleri*) and in having the lateral spine of the male gonopod larger and curved mesiad. Also, all of the Virginia *butleri* (from five localities) are somewhat larger than *rubrilata.* Of course, there is the possibility than the Virginia population may be different form that of Indiana, but this has no bearing on the identity of *rubrilata.* In addition to the type locality, it has been found also near Irvington, in Lancaster County (a single female, RLH no. 162, August 17, 1948).

The red pigment of *rubrilata* seems to be more extensive than in any other known xystodesmid. At a distance it is difficult to observe the thin black edge of the prozonite and the impression is that of a uniformly red milliped.

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Explanation of Plate

Figure 1. *Nannaria shenandoa*, n. sp., left gonopod of male, cephalic view. L—lateral process, M—mesial process, S—solenite.

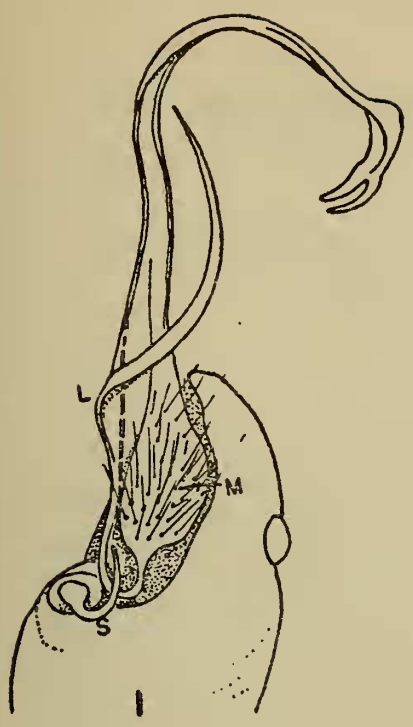
Figure 2. *Nannaria shenandoa*, left gonopod of male, mesial aspect.

Figure 3. *Nannaria shenandoa*, left gonopod of female, lateral view. R—receptacle, OV—outer valve.

Figure 4. *Nannaria shenandoa*, preanal scale and bases of last two pairs of legs, showing production of sternite.

Figure 5. *Saiulus montanus*, n. sp., gonopods of female, caudad view.

Figure 6. *Saiulus montanus*, gonopods of male, cephalic view.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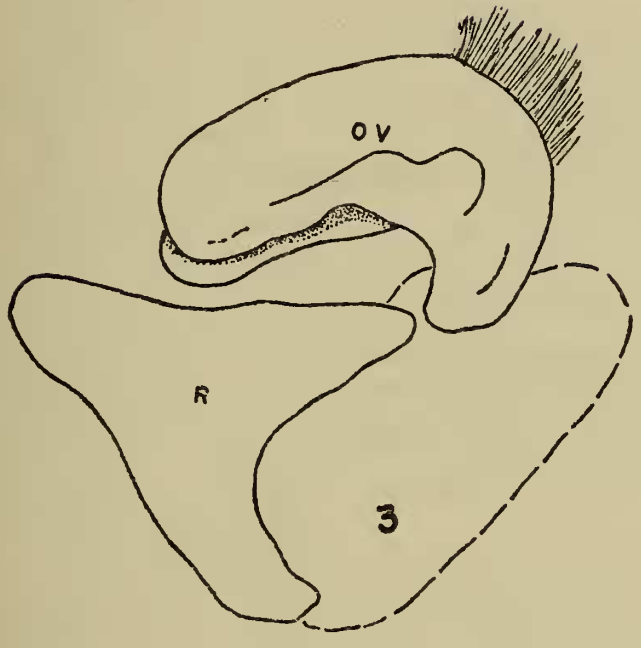
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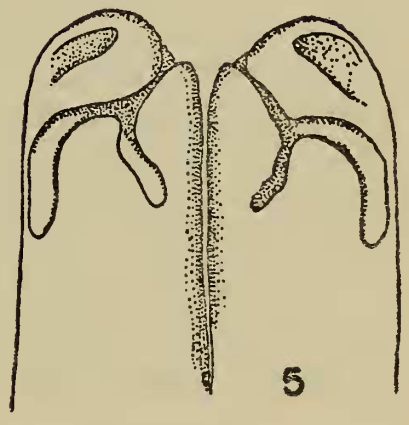
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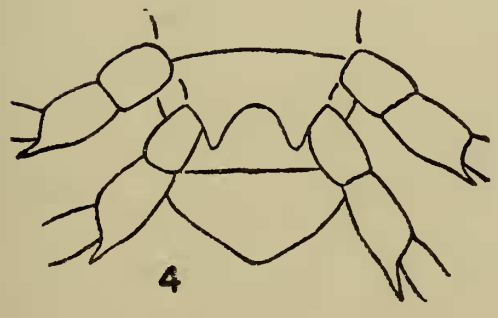
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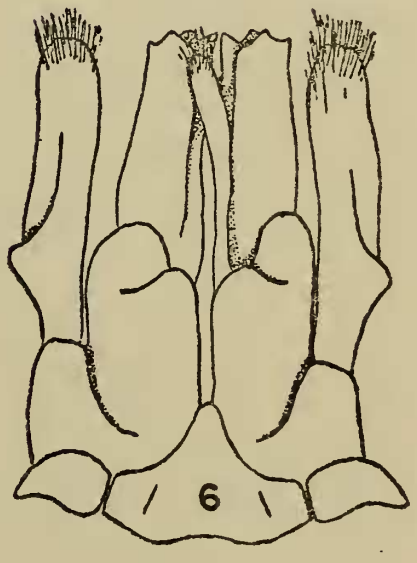
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